PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Gregory T. Galazin

For: SPRING BEAM SUSPENSION WITH COMPRESSED AXLE MOUNTING

Atty. Docket: 70774-1246

CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))

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Date: September 14, 2001

Andrea R. Wolters
(type or print name of person certifying)

Commissioner for Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

Sir:

Prior to examination in this application, kindly amend the above-identified U.S. patent application as follows:

In the Specification:

Kindly insert the following paragraph regarding the claim of priority for that currently in the application. A marked-up copy of the paragraph is attached as Appendix A.

—This application claims the benefit of International Patent Application No. PCT/US01/01689, filed January 18, 2001, which claims the benefit of U.S. Provisional Patent Application No. 60/177,023, filed January 19, 2000.—

In the Claims:

Kindly insert amended claims 1-33 as shown below. A marked-up copy of the claims is attached as Appendix B.

1. In a suspension comprising a pair of trailing arm assemblies adapted to

mount on a vehicle frame having a pair of spaced frame rails, each trailing arm assembly including:

a frame bracket adapted to be mounted to one of the frame rails;

a spring beam pivotally mounted at one end to the frame bracket for pivotal movement about a pivot axis and adapted to carry an axle at another end; and

a spring mounted to the trailing arm a spaced distance from the one end and adapted to mount to the corresponding vehicle frame rail to resist the rotational movement of the trailing arm toward the frame;

the improvement comprising:

an axle seat integrally formed in the spring beam for mounting an axle thereto.

2. The suspension according to claim 1 wherein the spring beam has a cylindrical-shaped portion that forms the axle seat.

3. The suspension according to claim 2 wherein the cylindrical-shaped portion defines an axle opening that is adapted to slidably receive the axle.

4. The suspension according to claim 3, wherein the spring beam has a flange that extends laterally from the cylindrical-shaped portion along a central portion of the spring beam for clamping the cylindrical-shaped portion around the axle.

5. The suspension according to claim 4 wherein the central portion of the spring beam and the flange have openings in registry with each other, and further comprising a bolt extending through the openings in the spring beam and the flange for clamping the cylindrical-shaped end around the axle.

6. The suspension according to claim 4 and further comprising a fastener that overlies a portion of the spring beam and is fixedly secured to the flange to fix the position of the flange relative spring beam.

7. The suspension according to claim 6 wherein the flange is a separate block that is fixed to an end portion of the cylindrical-shaped portion.

8. The suspension according to claim 7 wherein the fastener is a U-bolt, and the block has openings that receive portions of the U-bolt.

9. The suspension according to claim 7 wherein the fastener is a strap having a bight portion overlying the portion of the spring beam and hook portions partially encircling the axle.

10. The suspension according to claim 6 and further comprising a mounting bracket that is compressively retained to the spring beam by the fastener.

11. The suspension according to claim 10 wherein the fastener is fixedly secured to the mounting bracket.

12. The suspension according to claim 1 and further comprising an axle mounted in the axle seats in each of the trailing arm assemblies and an adhesive layer between the axle and the axle seats bonding the axle to the axle seats.

13. The suspension according to claim 12 wherein the axle seats are sized to substantially encircle the axle and are in tension along an inner surface of the axle seat to compress the axle and evenly distribute a compressive load on the axle across at least two sets of diametrically opposed external surfaces of the axle sufficient to prevent relative movement of the axle with respect to the axle seat under ordinary service conditions.

14. The suspension according to claim 13 wherein each of the axle seats is formed by bending another portion of the spring beam to define an axle opening that has a diameter less than a diameter of the axle when the other portion of the spring beam is in an unsprung state so that the other portion of the spring beam is in tension about the axle when the axle is mounted in the axle seat to thereby apply a compressive force to the axle.

15. The suspension according to claim 14 wherein the spring beam forms a traverse bolt opening for mounting the one end of the spring beam to the frame bracket for pivotal movement about a pivot axis, the spring beam has a longitudinal center line perpendicular

to the pivot axis and a longitudinal centerline transverse to the axle seat, and the axle seat longitudinal centerline is located outboard of the pivot axis longitudinal centerline.

16. The suspension according to claim 15 wherein the traverse bolt opening is cylindrically shaped.

17. The suspension according to claim 1 and further comprising a brake actuator rigidly mounted to the spring beam closely adjacent the axle seat.

18. The suspension according to claim 17 and further comprising an S-cam bearing rigidly mounted to the spring beam closely adjacent the axle seat.

19. In a suspension comprising a pair of trailing arm assemblies adapted to mount on a pair of spaced vehicle frame rails, each trailing arm assembly including:

a frame bracket adapted to be mounted to one of the frame rails;

a spring beam pivotally mounted at one end to the frame bracket for pivotal movement about a pivot axis and having an axle seat spaced from the one end and adapted to carry an axle, the spring beam having a longitudinal centerline transverse to the pivot axis and a longitudinal centerline transverse to the axle seat; and

a spring mounted to the trailing arm a spaced distance from the one end and adapted to mount to the corresponding vehicle frame rail to resist the rotational movement of the trailing arm toward the frame;

the improvement comprising:

the axle seat longitudinal centerline is located outboard of the pivot axis longitudinal centerline.

20. The suspension according to claim 19 wherein the spring beam has a cylindrical-shaped portion that integrally forms the axle seat.

21. The suspension according to claim 20 wherein the cylindrical-shaped portion has a flange extending laterally therefrom along a central portion of the spring beam for clamping the cylindrical-shaped portion around the axle.

22. The suspension according to 21 wherein the central portion of the spring beam and the flange have openings in registry with each other and further comprising a bolt extending through openings in the spring beam and the flange for clamping the cylindrical-shaped end around the axle.

23. The suspension according to claim 21 and further comprising a fastener that overlies a portion of the spring beam and is fixedly secured to the flange to fix the position of the flange relative spring beam .

24. The suspension according to claim 23 wherein the flange is a separate block that is fixed to an end portion of the cylindrical-shaped portion.

25. The suspension according to claim 21 and further comprising a mounting bracket that is compressively retained to the spring beam by the fastener .

26. The suspension according to claim 25 wherein the fastener is fixedly secured to the mounting bracket.

27. The suspension according to claim 19 and further comprising an axle mounted in the axle seat in each of the trailing arm assemblies and an adhesive layer between the axle and the axle seat bonding the axle to the axle seat.

28. The suspension according to claim 27 wherein the axle seat is sized to substantially encircle the axle and is in tension along an inner surface of the axle seat to compress the axle and evenly distribute a compressive load on the axle across at least two sets of diametrically opposed external surfaces of the axle sufficient, with the adhesive layer to prevent relative movement of the axle with respect to the axle seat under ordinary service conditions.

29. The suspension according to claim 28 wherein the axle seat is formed by bending another portion of the spring beam to define an axle opening that has a diameter less than a diameter of the axle when the other portion of the spring beam is in an unsprung state so that the other portion of the spring beam is in tension about the axle when the axle is mounted in the axle seat to thereby apply a compressive force to the axle.

30. The suspension according to claim 29 and further comprising a brake actuator rigidly mounted to the spring beam closely adjacent the axle seat.

31. The suspension according to claim 30 and further comprising an S-cam bearing rigidly mounted to the spring beam closely adjacent the axle seat.

32. The suspension according to claim 31 wherein the spring beam forms a transverse bolt opening for pivotally mounting the spring beam to the frame bracket.

33. The suspension according to claim 32 wherein the traverse bolt opening is cylindrically shaped.

REMARKS

By the present amendment, claims 1-33 have been amended. No new matter has been added by the foregoing amendment. Entry of the amendment is respectfully requested.

Respectfully submitted,

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Dated: 9/14/01

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CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of International Patent Application No. PCT/US01/01689, filed January 18, 2001, which claims the benefit of U.S. Provisional ~~p~~Patent ~~a~~Application No. 60/177,023, filed January 19, 2000.

secured to the flange ~~(80, 180)~~ to fix the position of the flange relative spring beam ~~(20, 120)~~.

7. The suspension ~~(10)~~ according to claim 6 wherein the flange is a separate block ~~(80)~~ that is fixed to an end portion of the cylindrical-shaped portion ~~(58)~~.

8. The suspension ~~(10)~~ according to claims ~~6 and~~ 7 wherein the fastener is a U-bolt ~~(84)~~, and the block has openings that receive portions of the U-bolt ~~(84)~~.

9. The suspension ~~(10)~~ according to claims ~~6 and~~ 7 wherein the fastener is a strap ~~(184)~~ having a bight portion ~~(185)~~ overlying the portion of the spring beam ~~(120)~~ and hook portions ~~(190)~~ partially encircling the axle ~~(16)~~.

10. The suspension ~~(10)~~ according to claims ~~6-9~~ and further comprising a mounting bracket ~~(34, 134)~~ that is compressively retained to the spring beam ~~(20, 120)~~ by the fastener ~~(84, 184)~~.

11. The suspension ~~(10)~~ according to claim 10 wherein the fastener ~~(184)~~ is fixedly secured to the mounting bracket ~~(134)~~.

12. The suspension ~~(10)~~ according to ~~any of~~ claims 1~~-11~~ and further comprising an axle ~~(16)~~ mounted in the axle seats ~~(62)~~ in each of the trailing arm assemblies ~~(12)~~ and an adhesive layer between the axle ~~(16)~~ and the axle seats ~~(62)~~ bonding the axle ~~(16)~~ to the axle seats ~~(62)~~.

13. The suspension ~~(10)~~ according to claim 12 wherein the axle seats ~~(62)~~ are sized to substantially encircle the axle ~~(16)~~ and are in tension along an inner surface of the axle seat ~~(62)~~ to compress the axle ~~(16)~~ and evenly distribute a compressive load on the axle ~~(16)~~ across at least two sets of diametrically opposed external surfaces of the axle ~~(16)~~ sufficient to prevent relative movement of the axle ~~(16)~~ with respect to the axle seat ~~(62)~~ under ordinary service conditions.

14. The suspension ~~(10)~~ according to claims ~~12 or~~ 13 wherein each of the axle seats ~~(62)~~ is formed by bending another portion of the spring beam ~~(20)~~ to define an axle opening ~~(63)~~ that has a diameter less than a diameter of the axle when the other portion of the spring beam ~~(20)~~ is in an unsprung state so that the other portion of the spring beam ~~(20)~~ is in tension about the axle when the axle is mounted in the axle seat ~~(62)~~ to thereby apply a compressive force to the axle ~~(16)~~.

secured to the flange ~~(80, 180)~~ to fix the position of the flange relative spring beam ~~(20, 120)~~.

7. The suspension ~~(10)~~ according to claim 6 wherein the flange is a separate block ~~(80)~~ that is fixed to an end portion of the cylindrical-shaped portion ~~(58)~~.

8. The suspension ~~(10)~~ according to claims ~~6 and~~ 7 wherein the fastener is a U-bolt ~~(84)~~, and the block has openings that receive portions of the U-bolt ~~(84)~~.

9. The suspension ~~(10)~~ according to claims ~~6 and~~ 7 wherein the fastener is a strap ~~(184)~~ having a bight portion ~~(185)~~ overlying the portion of the spring beam ~~(120)~~ and hook portions ~~(190)~~ partially encircling the axle ~~(16)~~.

10. The suspension ~~(10)~~ according to claims 6~~-9~~ and further comprising a mounting bracket ~~(34, 134)~~ that is compressively retained to the spring beam ~~(20, 120)~~ by the fastener ~~(84, 184)~~.

11. The suspension ~~(10)~~ according to claim 10 wherein the fastener ~~(184)~~ is fixedly secured to the mounting bracket ~~(134)~~.

12. The suspension ~~(10)~~ according to ~~any of~~ claims 1~~-11~~ and further comprising an axle ~~(16)~~ mounted in the axle seats ~~(62)~~ in each of the trailing arm assemblies ~~(12)~~ and an adhesive layer between the axle ~~(16)~~ and the axle seats ~~(62)~~ bonding the axle ~~(16)~~ to the axle seats ~~(62)~~.

13. The suspension ~~(10)~~ according to claim 12 wherein the axle seats ~~(62)~~ are sized to substantially encircle the axle ~~(16)~~ and are in tension along an inner surface of the axle seat ~~(62)~~ to compress the axle ~~(16)~~ and evenly distribute a compressive load on the axle ~~(16)~~ across at least two sets of diametrically opposed external surfaces of the axle ~~(16)~~ sufficient to prevent relative movement of the axle ~~(16)~~ with respect to the axle seat ~~(62)~~ under ordinary service conditions.

14. The suspension ~~(10)~~ according to claims ~~12 or~~ 13 wherein each of the axle seats ~~(62)~~ is formed by bending another portion of the spring beam ~~(20)~~ to define an axle opening ~~(63)~~ that has a diameter less than a diameter of the axle when the other portion of the spring beam ~~(20)~~ is in an unsprung state so that the other portion of the spring beam ~~(20)~~ is in tension about the axle when the axle is mounted in the axle seat ~~(62)~~ to thereby apply a compressive force to the axle ~~(16)~~.

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15. The suspension ~~(10)~~ according to ~~any of~~ claims ~~1~~–14 wherein the spring beam forms a traverse bolt opening for mounting the one end of the spring beam ~~(20)~~ to the frame bracket ~~(24)~~ for pivotal movement about a pivot axis, the spring beam ~~(20)~~ has a longitudinal center line perpendicular to the pivot axis ~~(23)~~ and a longitudinal centerline transverse to the axle seat, and the axle seat longitudinal centerline is located outboard of the pivot axis longitudinal centerline.

16. The suspension ~~(10)~~ according to claim 15 wherein the traverse bolt opening ~~(58)~~ is cylindrically shaped.

17. The suspension ~~(10)~~ according to ~~any of~~ claims 1–~~16~~ and further comprising a brake actuator ~~(42)~~ rigidly mounted to the spring beam ~~(20)~~ closely adjacent the axle seat ~~(62)~~.

18. The suspension ~~(10)~~ according to ~~any of~~ claims ~~1~~–17 and further comprising an S-cam bearing ~~(48)~~ rigidly mounted to the spring beam ~~(20)~~ closely adjacent the axle seat ~~(62)~~.

19. In a suspension ~~(10)~~ comprising a pair of trailing arm assemblies ~~(12)~~ adapted to mount on a pair of spaced vehicle frame rails ~~(14)~~, each trailing arm assembly including:

a frame bracket ~~(24)~~ adapted to be mounted to one of the frame rails ~~(14)~~;

a spring beam ~~(20)~~ pivotally mounted at one end to the frame bracket ~~(24)~~ for pivotal movement about a pivot axis ~~(23)~~ and having an axle seat spaced from the one end and adapted to carry an axle ~~(16)~~, the spring beam having a longitudinal centerline transverse to the pivot axis ~~(23)~~ and a longitudinal centerline transverse to the axle seat; and

a spring mounted to the trailing arm a spaced distance from the one end and adapted to mount to the corresponding vehicle frame rail to resist the rotational movement of the trailing arm toward the frame;

the improvement comprising:

the axle seat longitudinal centerline is located outboard of the pivot axis longitudinal centerline.

20. The suspension ~~(10)~~ according to claim 19 wherein the spring beam ~~(20)~~ has a cylindrical-shaped portion ~~(58)~~ that integrally forms the axle seat ~~(62)~~.

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21. The suspension ~~(10)~~ according to claim 20 wherein the cylindrical-shaped portion ~~(58)~~ has a flange ~~(60)~~ extending laterally therefrom along a central portion of the spring beam ~~(20)~~ for clamping the cylindrical-shaped portion ~~(58)~~ around the axle ~~(16)~~.

22. The suspension ~~(10)~~ according to 21 wherein the central portion of the spring beam ~~(20)~~ and the flange ~~(60)~~ have openings ~~(66, 68)~~ in registry with each other and further comprising a bolt ~~(74)~~ extending through openings in the spring beam ~~(20)~~ and the flange ~~(60)~~ for clamping the cylindrical-shaped end ~~(58)~~ around the axle ~~(16)~~.

23. The suspension ~~(10)~~ according to claim 21 and further comprising a fastener ~~(84, 184)~~ that overlies a portion of the spring beam ~~(20, 120)~~ and is fixedly secured to the flange ~~(80, 180)~~ to fix the position of the flange relative spring beam ~~(20, 120)~~.

24. The suspension ~~(10)~~ according to claim 23 wherein the flange is a separate block ~~(80)~~ that is fixed to an end portion of the cylindrical-shaped portion ~~(58)~~.

25. The suspension ~~(10)~~ according to claims 21 ~~or 24~~ and further comprising a mounting bracket ~~(34, 134)~~ that is compressively retained to the spring beam ~~(20, 120)~~ by the fastener ~~(84, 184)~~.

26. The suspension ~~(10)~~ according to claim 25 wherein the fastener ~~(184)~~ is fixedly secured to the mounting bracket ~~(134)~~.

27. The suspension ~~(10)~~ according to ~~any of~~ claims 19~~-26~~ and further comprising an axle ~~(16)~~ mounted in the axle seat ~~(62)~~ in each of the trailing arm assemblies ~~(12)~~ and an adhesive layer between the axle ~~(16)~~ and the axle seat ~~(62)~~ bonding the axle ~~(16)~~ to the axle seat ~~(62)~~.

28. The suspension ~~(10)~~ according to claim 27 wherein the axle seat ~~(62)~~ is sized to substantially encircle the axle ~~(16)~~ and is in tension along an inner surface of the axle seat ~~(62)~~ to compress the axle ~~(16)~~ and evenly distribute a compressive load on the axle ~~(16)~~ across at least two sets of diametrically opposed external surfaces of the axle ~~(16)~~ sufficient, with the adhesive layer to prevent relative movement of the axle ~~(16)~~ with respect to the axle seat ~~(62)~~ under ordinary service conditions.

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29. The suspension~~(10)~~ according to claims ~~27 or~~ 28 wherein the axle seat~~(62)~~ is formed by bending another portion of the spring beam~~(20)~~ to define an axle opening~~(63)~~ that has a diameter less than a diameter of the axle when the other portion of the spring beam~~(20)~~ is in an unsprung state so that the other portion of the spring beam ~~(20)~~ is in tension about the axle when the axle is mounted in the axle seat~~(62)~~ to thereby apply a compressive force to the axle~~(16)~~.

30. The suspension~~(10)~~ according to ~~any of~~ claim